Index Of Repair Retrofit Bridge Standards

Standard	Description
1031	Retrofit Barrier Rail Details
1031C	Retrofit Barrier Rail Details
1031D	Retrofit Barrier Rail Details with Conduit
1031E	Retrofit Barrier Rail Details
1031F	Retrofit Barrier Rail Details With Conduit
1031M-1	Retrofit Bridge Barrier End
1031M-2	Retrofit Bridge Barrier End
1031T	Retrofit Barrier Rail Details
1038	Deck Overlay Repair - Quantities
1038R	Deck Re-Overlay Repair - Quantities
1040	Overlay Deck Repair Details and Raised Expansion Plates
1040R	Re-Overlay Deck Repair Details
1042	Deck Repair - Approach Pavement
1045	Concrete Repairs
1055	Concrete Beam Repair Details
1057s1	Concrete Beam Fiber Reinforced Polymer (FRP) Repair Details
1057s2	Concrete Beam Fiber Reinforced Polymer (FRP) Repair Details

Revised 03-2017: Issued Standard Sheets 1055, 1057s1 And 1057s2. Standard Sheets 1039s1 & 1039s2 Now Void.
Revised 08-2025: Issued Standard Sheets 1031M-1 and 1031M-2.
Revised 08-2026: Changed Description name of 1040 (was "Deck Overlay..."). Changed Description name of 1041R (was "Deck Re-Overlay...").
RepairRetrofitBridges.dgn - 100-RR - This Sheet Issued 02-2010. This Sheet Re-Issued 07-2023.

Index of Repair Standards

FILE NO.	ENGLISH	DESIGN TEAM	Index Of Repair Retrofit Bridge Standards	Standard Sheet 100-RR	COUNTY	PROJECT NUMBER	SHEET NUMBER	

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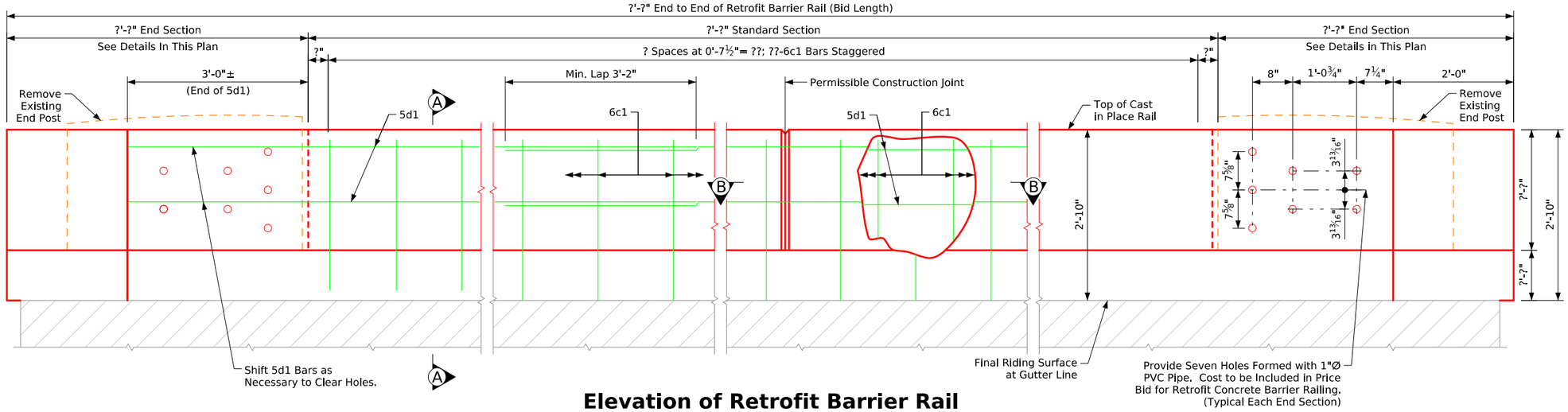
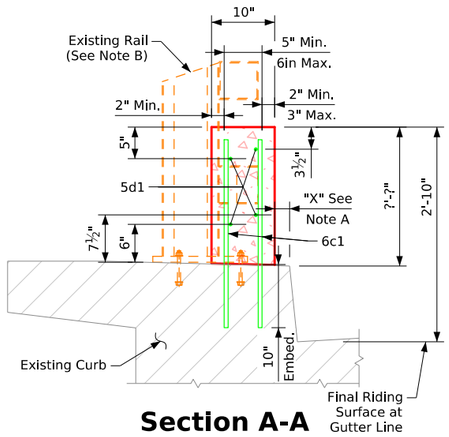
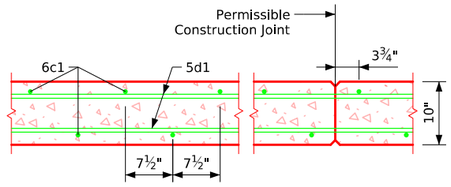


Elevation of Retrofit Barrier Rail



Section A-A



Section B-B

(Showing 6c1 Placement)

Note A: For dimension "X" see Design Sheet No. ? in these plans.

Note B: Existing rail is to be removed. Anchor bolts which are not stainless steel shall be cut off flush with or slightly below curb surface and the remaining exposed ends painted with 2 coats of zinc rich paint. If the existing anchor bolts are stainless steel they may be left in position at the Contractor's option subject to the approval of the Engineer.

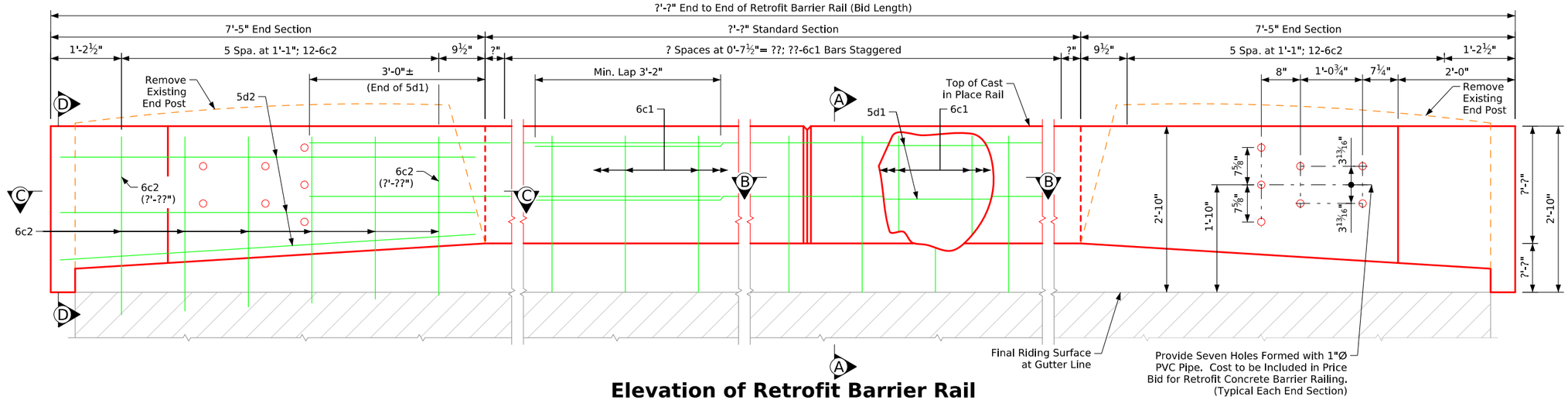
Epoxy Reinforcing Steel - ? Rail

Bar	Location	Shape	No.	Length	Weight
6c1	Standard Rail, Vert.		?	?'-?"	?
5d1	Standard Rail, Longit.		?	?'-?"	?
				Total (lbs.)	?

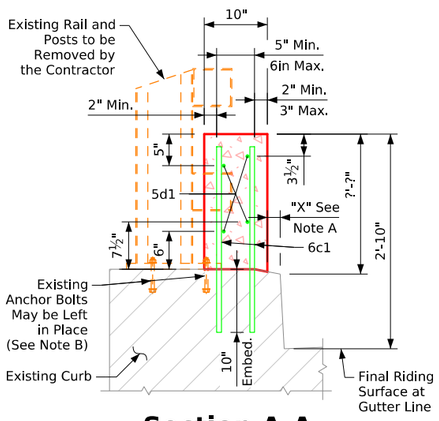
For the details listed below see Design Sheet No. ?
- Rail Joint Details
- Dowel Setting Note
- Retrofit Barrier Rail Notes
- Concrete Placement Summary
- Estimated Quantities Box

Retrofit Barrier Rail Details

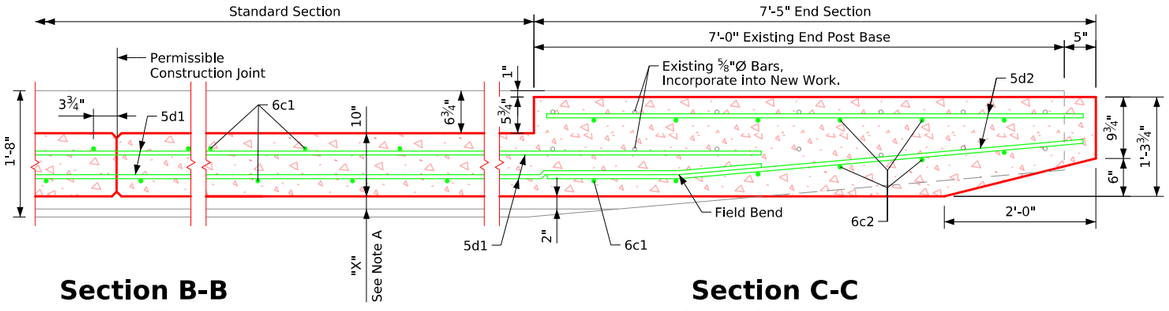
Revised: 05-2015; Reference To 1"Ø PVC Pipe was Changed from 1"Ø Plastic Conduit.
RepairRetrofitBridges.dgn - 1031 - This Sheet Redrawn 02-26-1990. This Sheet Re-Issued 07-2023.



Elevation of Retrofit Barrier Rail



Section A-A



Section B-B
(Showing 6c1 Placement)

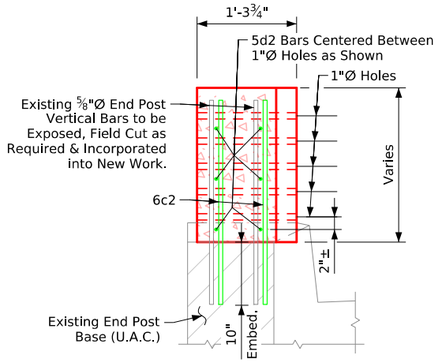
Section C-C
(Showing 6c2 Placement)

Note A: For dimension "X" see Design Sheet No. ? In these plans.

Note B: Existing rail is to be removed. Anchor bolts that will have at least 2" of concrete cover when encompassed by the new barrier rail may be left in place at the Contractor's option subject to the approval of the Engineer. Any anchor bolts not having the 2" min. cover shall be cut off flush with or slightly below the top of curb and ends of non-stainless steel bolts painted with two coats of zinc rich paint.

Stainless steel anchor bolts outside the area of new barrier rail may be left in place at Contractor's option subject to approval of the Engineer. Stainless steel bolts need not be painted.

Non-stainless steel anchor bolts outside of the area of new barrier rail shall be cut off flush with or slightly below top of curb surface and the remaining exposed ends painted with two coats of zinc rich paint.



Section D-D

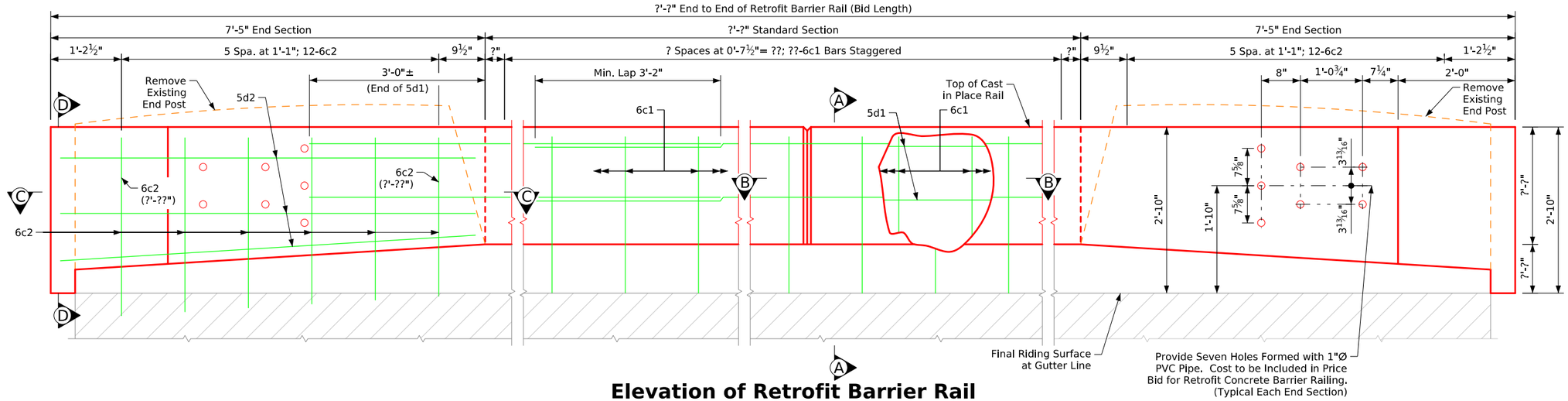
Epoxy Reinforcing Steel - ? Rail

Bar	Location	Shape	No.	Length	Weight
6c1	Standard Rail, Vert.		?	?'-?"	?
6c2	End Section, Vert.		?	?'-?"	?
5d1	Standard Rail, Longit.		?	?'-?"	?
5d2	End Section, Longit.		?	6'-8"	?
				Total (lbs.)	?

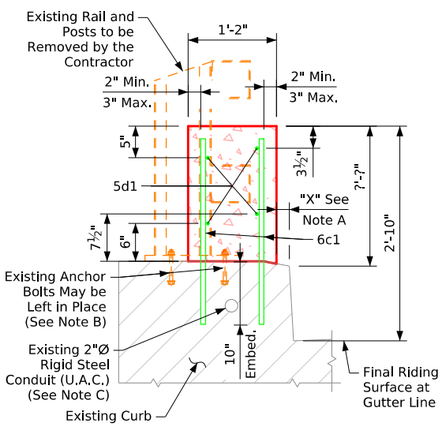
For the details listed below see Design Sheet No. ?
- Rail Joint Details
- Dowel Setting Note
- Retrofit Barrier Rail Notes
- Concrete Placement Summary
- Estimated Quantities Box

Retrofit Barrier Rail Details

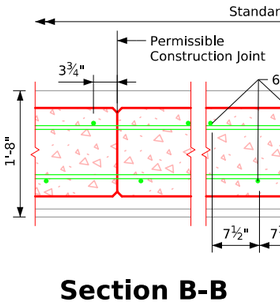
Revised: 05-2015; Reference To 1"Ø PVC Pipe was Changed from 1"Ø Plastic Conduit.
RepairRetrofitBridges.dgn - 1031C - This Sheet Redrawn 11-03-1988. This Sheet Re-Issued 07-2023.



Elevation of Retrofit Barrier Rail



Section A-A

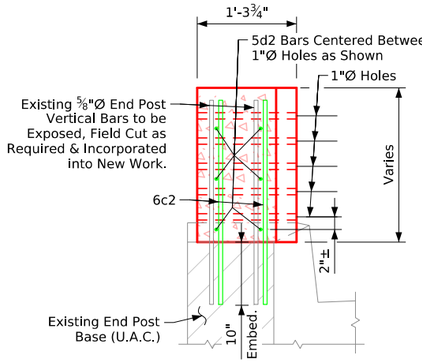


Section B-B

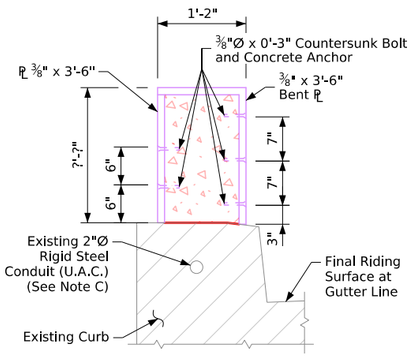
(Showing 6c1 Placement)

Section C-C

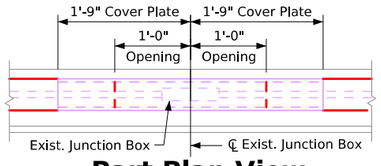
(Showing 6c2 Placement)



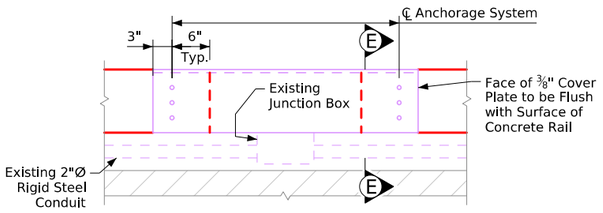
Section D-D



Section E-E



Part Plan View



Part Elevation View

The retrofit rail shall be gapped at existing junction boxes as detailed. The vertical bars shall be shifted as required and the longitudinal bars shall be field cut as required. Cut ends of longitudinal bars shall be patched with epoxy. A ⅜" galvanized plate shall fit over the gapped area in the rail and shall be held in place with countersunk bolts and concrete anchors. The cost of the galvanized plates and anchorage system shall be incidental to the cost of the retrofit rail.

Required at ??? existing junction boxes.

Epoxy Reinforcing Steel - ? Rail

Bar	Location	Shape	No.	Length	Weight
6c1	Standard Rail, Vert.		?	?'-?"	?
6c2	End Section, Vert.		?	?'-?"	?
5d1	Standard Rail, Longit.		?	?'-?"	?
5d2	End Section, Longit.		?	6'-8"	?
				Total (lbs.)	?

Note A: For dimension "X" see Design Sheet No. ? in these plans.

Note B: Existing rail is to be removed. Any anchor bolts that will have at least 2" of concrete cover when encompassed by the new barrier rail may be left in place at the Contractor's option subject to the approval of the Engineer. Any anchor bolts not having the 2" min. cover shall be cut off flush with or slightly below the top of curb and ends of non-stainless steel bolts painted with two coats of zinc rich paint.

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Non-stainless steel anchor bolts outside of the area of new barrier rail shall be cut off flush with or slightly below top of curb surface and the remaining exposed ends painted with two coats of zinc rich paint.

Note C: The Contractor's attention is directed to the existing conduit in the bridge curbs. In order to ensure the existing conduits and/or electrical service (if present) are not damaged during placement of the retrofit concrete barrier railing, the Contractor shall be required to do the following:

1. Physically locate the conduit at approximately 50' intervals prior to drilling any holes for ¾" diameter dowel bars.
2. After completion of drilling for the ¾" dowel bars and prior to placement of the dowels; prove to the Inspector by a reasonable method, the usability of the conduit has not been compromised.

Cost of these operations will be considered incidental to the cost of the retrofit concrete barrier railing. Any damage to the conduit or wiring by the Contractor will be the responsibility of the Contractor and repaired at no extra cost to the State.

For the details listed below see Design Sheet No. ?
- Rail Joint Details
- Dowel Setting Note
- Retrofit Barrier Rail Notes
- Concrete Placement Summary
- Estimated Quantities Box

Retrofit Barrier Rail Details

Revised: 05-2015; Reference to 1"Ø PVC Pipe was Changed from 1"Ø Plastic Conduit.
RepairRetrofitBridges.dgn - 1031D - This Sheet Redrawn 11-03-1988. This Sheet Re-Issued 07-2023.

FILE NO.	ENGLISH	DESIGN TEAM	Retrofit Barrier Rail Details With Conduit	Standard Sheet 1031D	COUNTY	PROJECT NUMBER	SHEET NUMBER	

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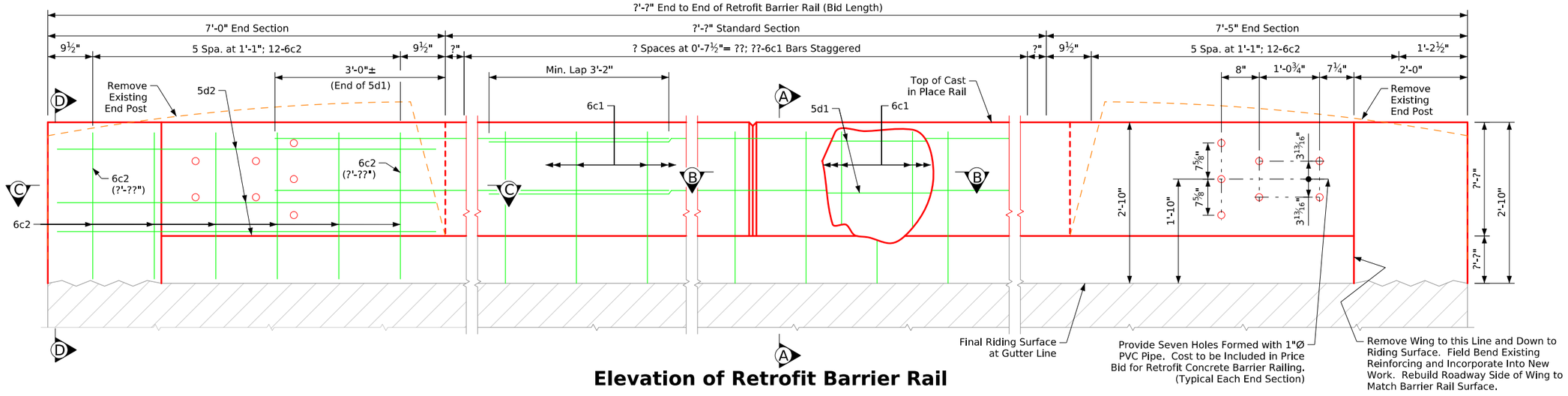
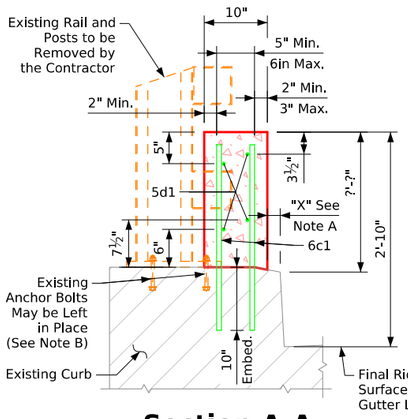
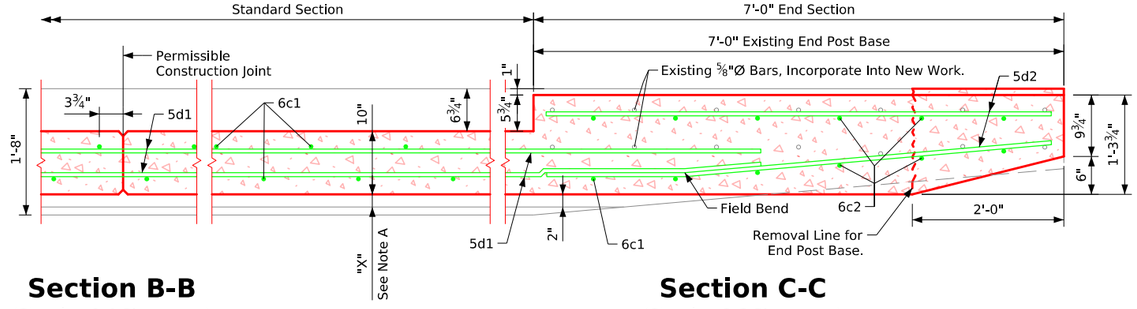


Elevation of Retrofit Barrier Rail



Section A-A



Section B-B

(Showing 6c1 Placement)

Section C-C

(Showing 6c2 Placement)

Note A: For dimension "X" see Design Sheet No. ? In these plans.

Note B: Existing rail is to be removed. Anchor bolts that will have at least 2" of concrete cover when encompassed by the new barrier rail may be left in place at the Contractor's option subject to the approval of the Engineer. Any anchor bolts not having the 2" min. cover shall be cut off flush with or slightly below the top of curb and ends of non-stainless steel bolts painted with two coats of zinc rich paint.

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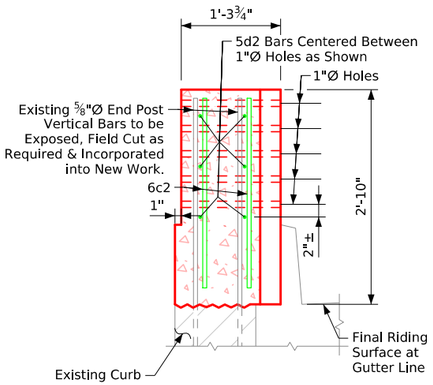

Section D-D

Epoxy Reinforcing Steel - ? Rail

Bar	Location	Shape	No.	Length	Weight
6c1	Standard Rail, Vert.		?	?'-?"	?
6c2	End Section, Vert.		?	?'-?"	?
5d1	Standard Rail, Longit.		?	?'-?"	?
5d2	End Section, Longit.		?	6'-8"	?
				Total (lbs.)	?

For the details listed below see Design Sheet No. ?
- Rail Joint Details
- Dowel Setting Note
- Retrofit Barrier Rail Notes
- Concrete Placement Summary
- Estimated Quantities Box

Retrofit Barrier Rail Details

Revised: 05-2015; Reference To 1"Ø PVC Pipe was Changed from 1"Ø Plastic Conduit.
RepairRetrofitBridges.dgn - 1031E - This Sheet Redrawn 05-25-1999. This Sheet Re-Issued 07-2023.

FILE NO.	ENGLISH	DESIGN TEAM	Retrofit Barrier Rail Details	Standard Sheet 1031E	COUNTY	PROJECT NUMBER	SHEET NUMBER	

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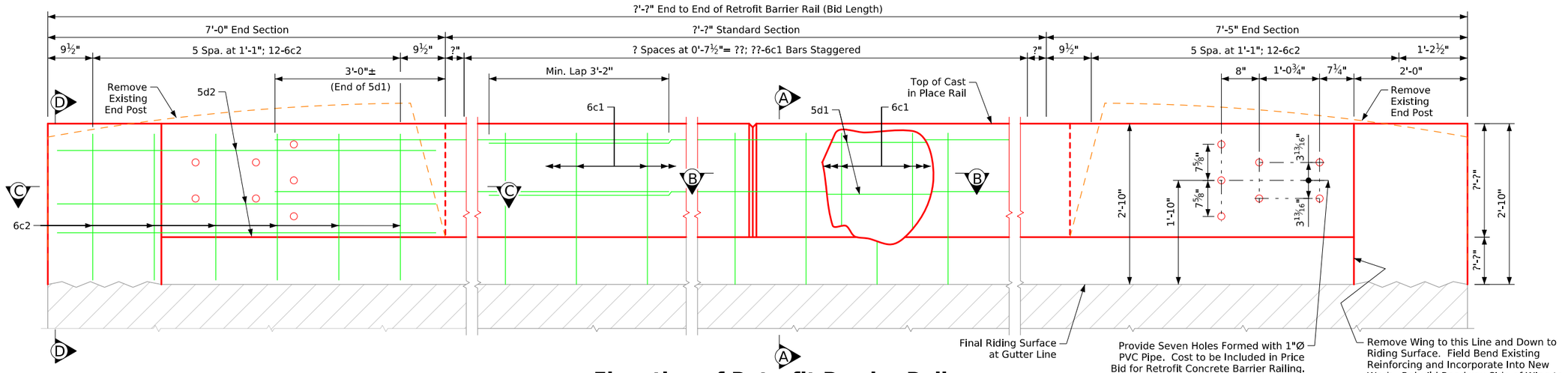
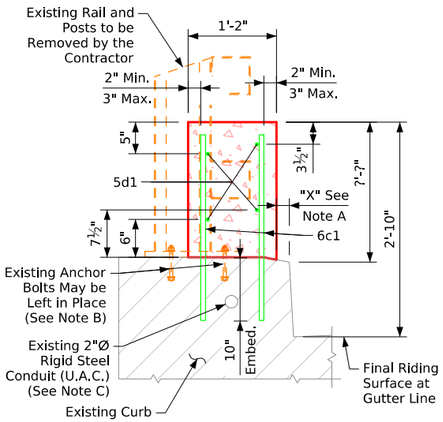


Elevation of Retrofit Barrier Rail



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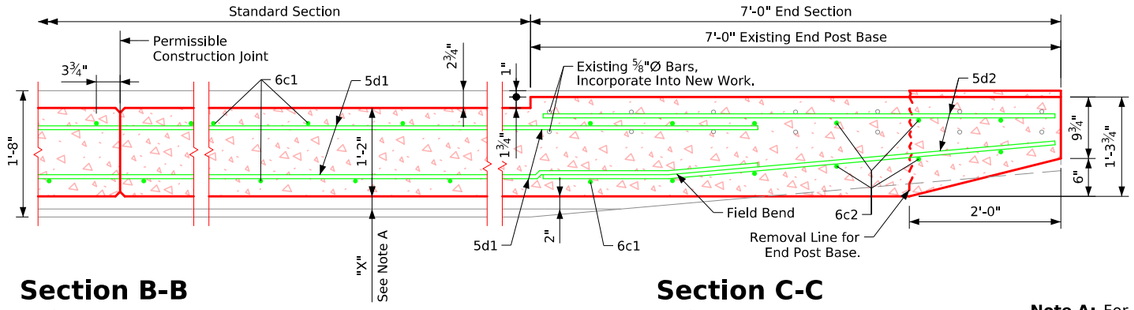
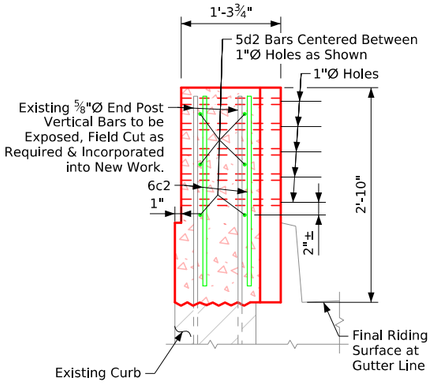


Section B-B
(Showing 6c1 Placement)

Section C-C
(Showing 6c2 Placement)



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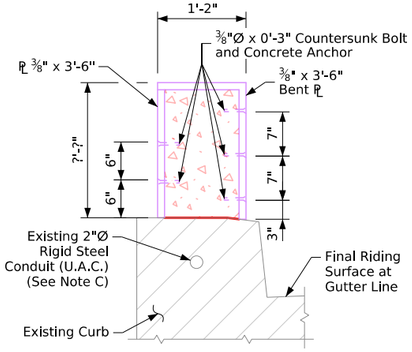
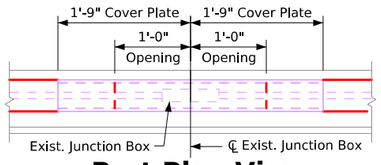
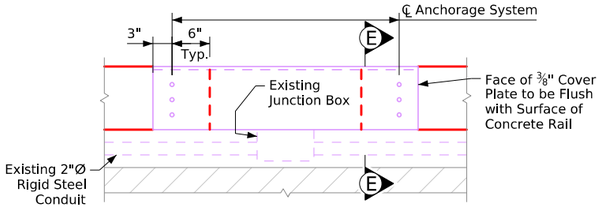


Section E-E



Part Plan View



Part Elevation View

The retrofit rail shall be gapped at existing junction boxes as detailed. The vertical bars shall be shifted as required and the longitudinal bars shall be field cut as required. Cut ends of longitudinal bars shall be patched with epoxy. A ⅜" galvanized plate shall fit over the gapped area in the rail and shall be held in place with countersunk bolts and concrete anchors. The cost of the galvanized plates and anchorage system shall be incidental to the cost of the retrofit rail.

Required at ??? existing junction boxes.

Epoxy Reinforcing Steel - ? Rail

Bar	Location	Shape	No.	Length	Weight
6c1	Standard Rail, Vert.		?	?'-?"	?
6c2	End Section, Vert.		?	?'-?"	?
5d1	Standard Rail, Longit.		?	?'-?"	?
5d2	End Section, Longit.		?	6'-8"	?
				Total (lbs.)	?

Note A: For dimension "X" see Design Sheet No. ? in these plans.

Note B: Existing rail is to be removed. Any anchor bolts that will have at least 2" of concrete cover when encompassed by the new barrier rail may be left in place at the Contractor's option subject to the approval of the Engineer. Any anchor bolts not having the 2" min. cover shall be cut off flush with or slightly below the top of curb and ends of non-stainless steel bolts painted with two coats of zinc rich paint.

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1. Physically locate the conduit at approximately 50' intervals prior to drilling any holes for ¾" diameter dowel bars.
2. After completion of drilling for the ¾" dowel bars and prior to placement of the dowels; prove to the Inspector by a reasonable method, the usability of the conduit has not been compromised.

Cost of these operations will be considered incidental to the cost of the retrofit concrete barrier railing. Any damage to the conduit or wiring by the Contractor will be the responsibility of the Contractor and repaired at no extra cost to the State.

For the details listed below see Design Sheet No. ?
- Rail Joint Details
- Dowel Setting Note
- Retrofit Barrier Rail Notes
- Concrete Placement Summary
- Estimated Quantities Box

Retrofit Barrier Rail Details

Revised: 05-2015: Reference To 1"Ø PVC Pipe was Changed from 1"Ø Plastic Conduit.
RepairRetrofitBridges.dgn - 1031F - This Sheet Redrawn 05-25-1999. This Sheet Re-Issued 07-2023.

FILE NO.	ENGLISH	DESIGN TEAM	Retrofit Barrier Rail Details With Conduit	Standard Sheet 1031F	COUNTY	PROJECT NUMBER	SHEET NUMBER	

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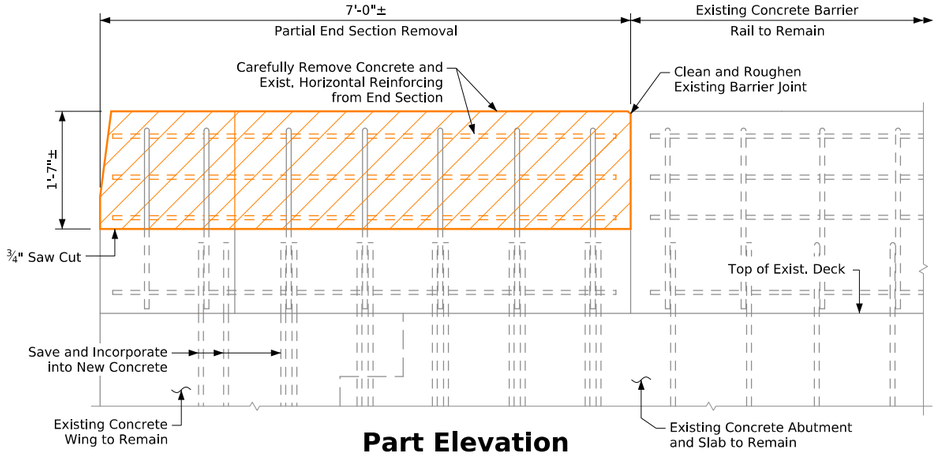
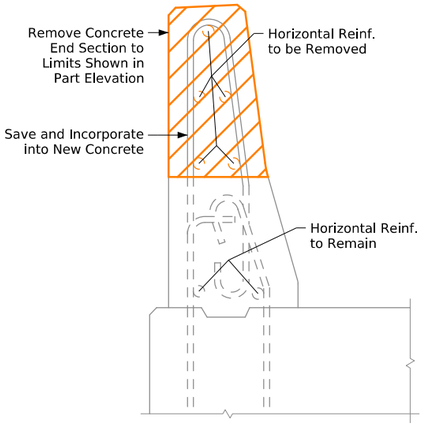


Part Elevation



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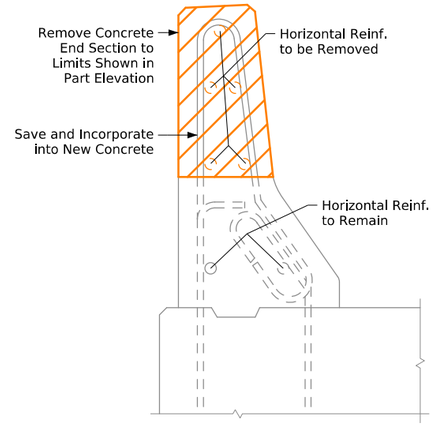

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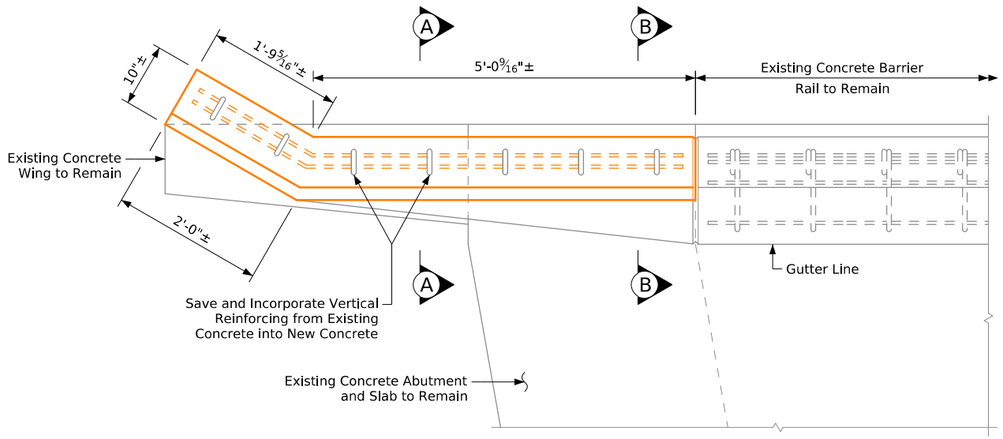


Part Plan

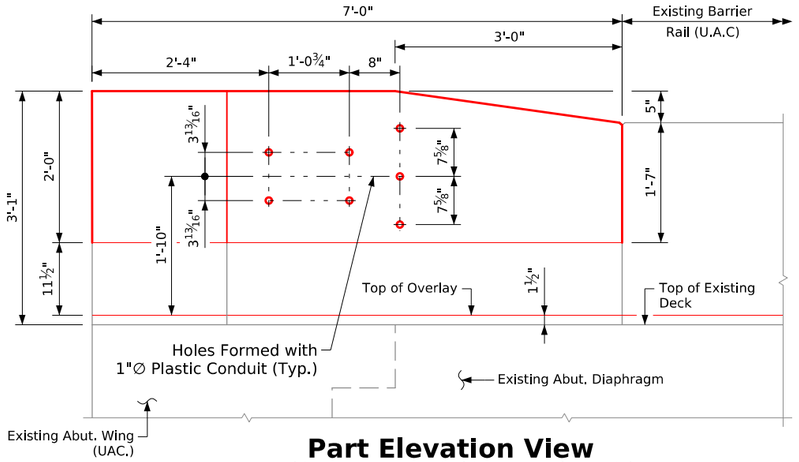
Removal Notes:

Hatched areas indicate Concrete Removal.

This sheet shows details of the Partial Superstructure Removal on the existing bridge. All partial removals shall be in accordance with Section 2401 of the Standard Specifications. All such removals shall be to neat saw cuts to provide clean straight surfaces at interfaces between new concrete and remaining concrete. The removal shall be done in a manner which will prevent any damage to the existing structure to remain. The Contractor shall assume full responsibility for any damage caused, and shall repair any damaged area to its original condition, as directed by the Engineer, at the Contractor's expense. Any existing reinforcing steel which is to be "saved" that is exposed during removal operations is to be carefully protected, cleaned and incorporated into new construction unless noted otherwise.

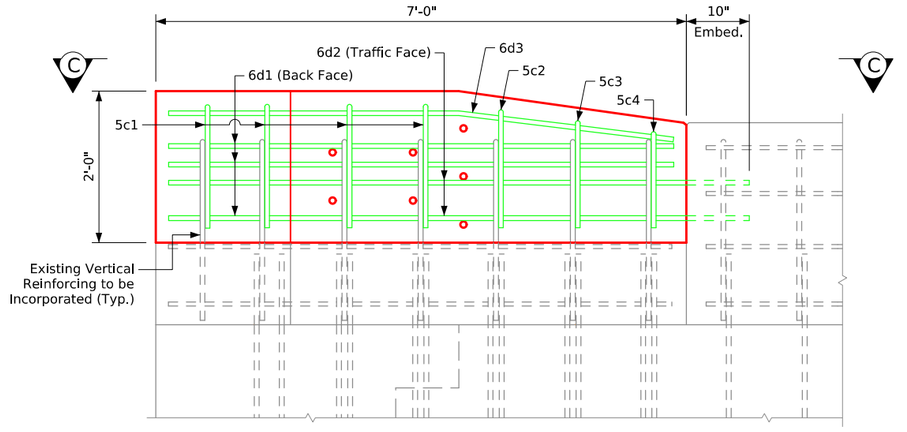
Start all removals with ¾" saw cut.

Retrofit Bridge Barrier End

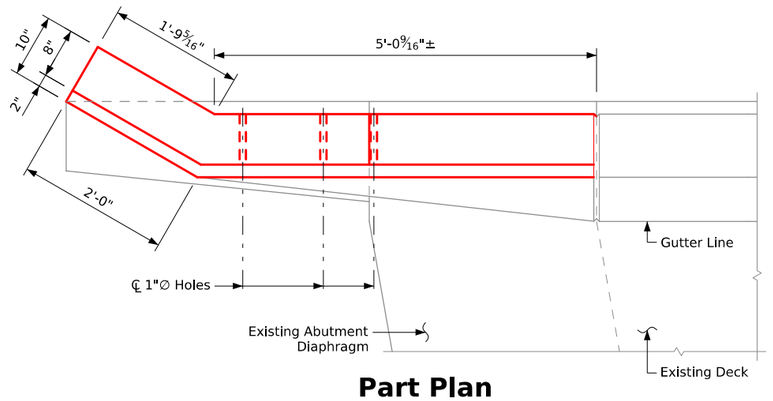


Part Elevation View

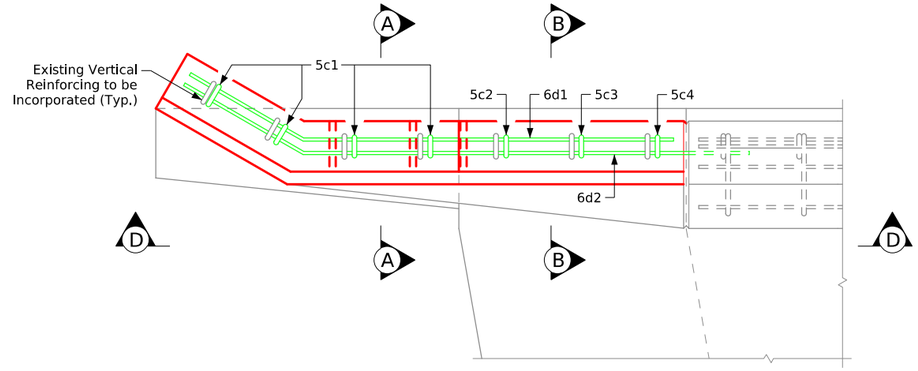
Provide 7 Holes Formed with 1"∅ Plastic Conduit.
Cost to be Included in Price Bid for "Structural Concrete (Misc.)"



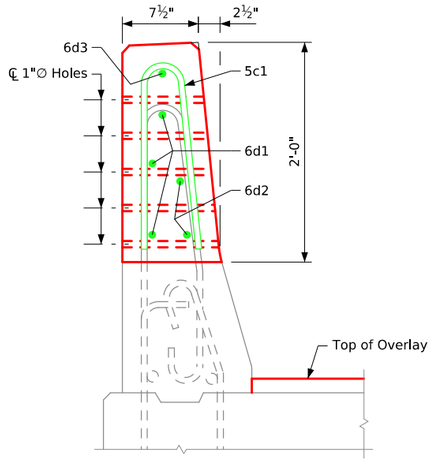
Part View D-D



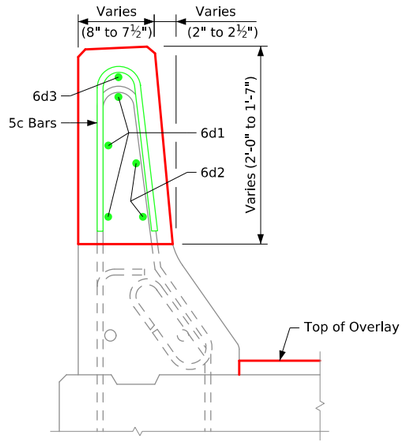
Part Plan



Part View C-C



Section A-A



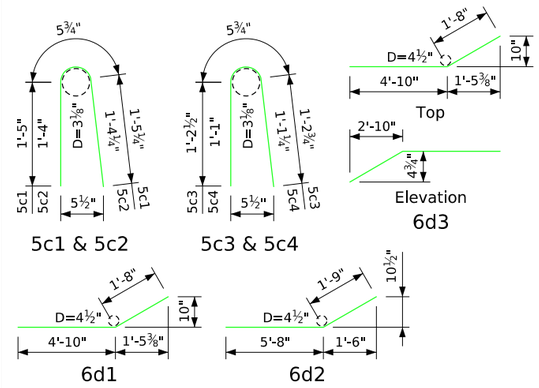
Section B-B

Epoxy Reinforcing Steel

One End Section

Bar	Location	Shape	No.	Length	Weight
5c1	End Section, Vert.		4	3'-4"	14
5c2	End Section, Vert.		1	3'-2"	3
5c3	End Section, Vert.		1	2'-11"	3
5c4	End Section, Vert.		1	2'-8"	3
6d1	Back Face, Horiz.		3	6'-6"	29
6d2	Traffic Face, Horiz. Dowels		2	7'-5"	22
6d3	Top, Horiz.		1	6'-6"	10
				Total (lbs.)	84

Bent Bar Details



Note: All dimensions are out to out. D = Pin Diameter

Concrete Placement Summary

Section	Total
Barrier Rail One End Section	0.37 Cu. Yd.
Total	0.37 Cu. Yd.

The 6d2 bars shall be set as dowels in drilled holes. Holes are to be 10" deep. The dowels shall be installed in accordance with the manufacturer's recommendations. The following systems shall be used as a bonding agent:

A. Polymer grout system in accordance with Article 2301.03, E, of the Standard Specifications.

The price bid for "Structural Concrete, Misc." shall include the costs of setting bars as dowels in the Existing Barrier.

Note:
Construction Joints shall be cleaned and roughened.

Retrofit Bridge Barrier End

Revised 08-2026: In "Part Elevation View", added call-out note and vertical 7⅞" dimensions to 1"∅ holes formed with plastic conduit.
RepairRetrofitBridges.dgn - 1031M-2 - This Sheet Issued 08-2025.

FILE NO.	ENGLISH	DESIGN TEAM	Retrofit Barrier Rail End Section Details (2 of 2)	Standard Sheet 1031M-2	COUNTY	PROJECT NUMBER	SHEET NUMBER	

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Estimated Bridge Rail Retrofit Quantities

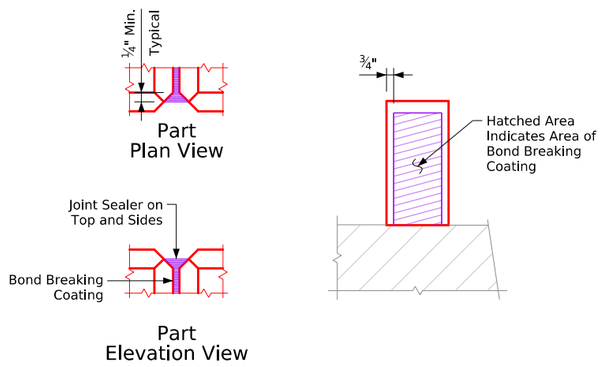
Quantities Needed:
Retrofit Concrete Barrier Railing,
Removal Of Existing Handrail,
And End Posts

Dowel Setting Note:
The ? bars shall be set as dowels in drilled holes. Holes are to be 10" deep. The dowels shall be installed in accordance with the manufacturer's recommendations. Either of the following systems may be used as a bonding agent for vertical dowels, but only System "A" may be used for horizontal dowels:

-Polymer grout system shall be in accordance with Article 2301.03,E, of the Standard Specifications.

-Hydraulic cement grout systems. Drilled holes are to be 2½ times the dowel diameter and are to be blown clean with compressed air immediately prior to placing grout. The hydraulic cement grout shall be one of those approved in Materials I.M. 491.13 and shall be used in accordance with the manufacturer's recommendations.

Note A: (See Section A-A on Design Sheet No. ?). On each rail of bridge, dimension "X" shall be a minimum of 1" and a maximum of 3", but must be constant for full length of bridge; however, approximately 10 linear feet at either end of standard rail section shall be transitioned to 2" at end section as shown.



Retrofit Barrier Rail Joint Details

Specifications:

Design:
AASHTO Series of 2002
Construction:
Iowa Department of Transportation Standard Specifications for Highway and Bridge Construction, Series 2015, plus applicable General Supplemental Specifications, Developmental Specifications, Supplemental Specifications and Special Provisions shall apply to construction work on this project.
?
?

Design Stresses:

Design stresses for the following materials are in accordance with the AASHTO Standard Specifications for Highway Bridges, Series of 2002.
Reinforcing steel in accordance with Section 8, Grade 60.
Concrete in accordance with Section 8, f'c = 4.0 KSI.

Retrofit Barrier Railing Notes:

Minimum clear distance from face of concrete to near reinforcing bar is to be 2" unless otherwise noted or shown.

The permissible construction joints are to be placed between vertical bars at a minimum spacing of 20'. Construction joint contact surfaces are to be coated with an approved bond breaker.

All dimensions and details shown in these plans pertinent to new construction in relation to existing portions of the structure shall be verified in the field by the Bridge Contractor before starting construction.

Faint lines on plans indicate the existing structure.

These bridge plans label all reinforcing steel with English notation (5a1 is ⅝" diameter bar). English reinforcing steel received in the field may display the following "Bar Designation". The "Bar Designation" is the stamped impression on the reinforcing bars, and is equivalent to the bar diameter in millimeters.

English size	3	4	5	6	7	8	9	10	11
Bar designation	10	13	16	19	22	25	29	32	36

Cost of joint sealer and bond breaker shall be considered incidental to other construction.

The Retrofit Barrier Rail is to be bid on a lineal foot basis measured from end to end of rail. The number of lineal feet of Retrofit Barrier Rail installed will be paid for at the contract price per lineal foot based on plan quantities. Price bid for Retrofit Concrete Barrier Railing shall be full compensation for furnishing all material (including reinf. steel and 1"Ø PVC pipe) plus all of the equipment and labor required to erect the rail in accordance with these plans and current specifications.

All Retrofit Barrier Rail concrete is to be either Class BR mix or Class C mix.

Class BR concrete shall be used for the Slip-Forming method.

Class C concrete shall be used for the Cast-In-Place method. The price bid for the Cast-In-Place method shall include the formwork.

All reinforcing steel is to be Grade 60 and Epoxy Coated.

The joint sealer shall be Light Gray Nonsag Latex Caulking Sealer marketed for outdoor use. No testing or certification is required.

The price bid for "Removal of Existing Handrail and End Posts" shall include all costs associated with dismantling the existing ? Handrail (approx. ?? L.F. and ?? Posts). The rails and posts are to become the property of the Contractor and removed from the site by the Contractor. The bid item shall also include all costs associated with the removal of the existing concrete end posts and the cutting off and painting of the existing rail post anchor bolts if required.

Any removals required shall be in accordance with Section 2401, of the Standard Specifications. Any damage to other portions of the existing structure not noted for removal shall be repaired by the Contractor at no cost to the State.

Existing bridge rail is not to be removed until authorized by the Engineer.

Concrete Placement Summary

Section		Total
Standard Section	? at ? Cu. Yds. Per Lin. Ft	?
End Sections	? at ? Cu. Yds. Per Section	?
	Total (Cu. Yds.)	?

Design History at this Site
(Includes this Design)

Des. No.	Type of Work
???	???
???	???

Retrofit Barrier Rail Details

Revised 11-2015: Modified "Design History" Table to State "(Includes this Design)".
Revised 03-2017: Modified Construction: Standard Specifications Bridge Construction, Series to 2015, (Was 2012).
RepairRetrofitBridges.dgn - 1031T - This Sheet Issued 01-2001. This Sheet Re-Issued 07-2023.

FILE NO.	ENGLISH	DESIGN TEAM	Retrofit Barrier Rail Details	Standard Sheet 1031T	COUNTY	PROJECT NUMBER	SHEET NUMBER	

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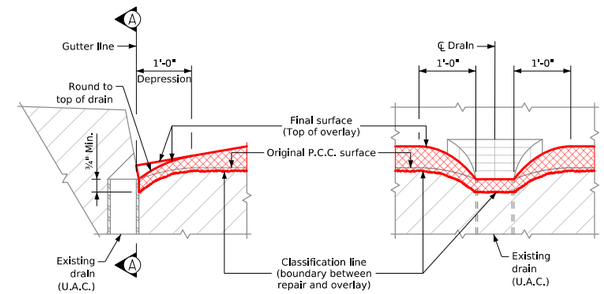
Control Point:

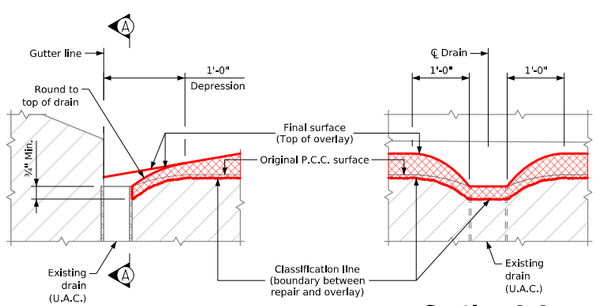
Note: Deck Repair Drawing Models are Referenced Outside of Border. Either Move in Place or Modify "Orientation" in Reference Dialog.



Section A-A

Deck Repair Detail at Drain

(Required at ?? Locations)

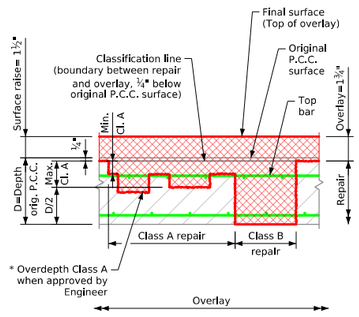


Section A-A

Deck Repair Detail at Drain

(Required at ?? Locations)

* Per IDOT Std. Spec. 2413.03.C.3.b, limited areas of Class A removal may exceed 50% of the floor thickness at the Engineer's direction. These limited areas of excess depth (overdepth) will be measured as Class A deck repair.



Repair and Overlay Definition

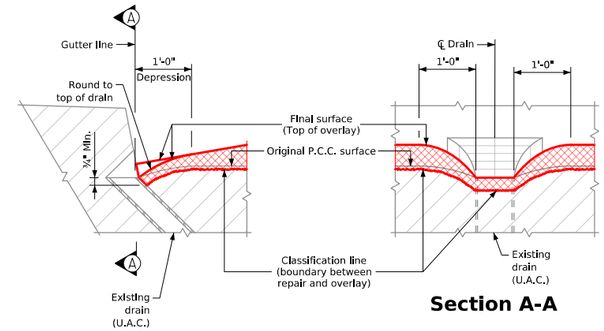
Location:
Maintenance No.

Note: Roadway quantites shown elsewhere in these plans.

Design History at this Site
(Includes this Design)

Des. No.	Type of Work
???	Original Design
???	???

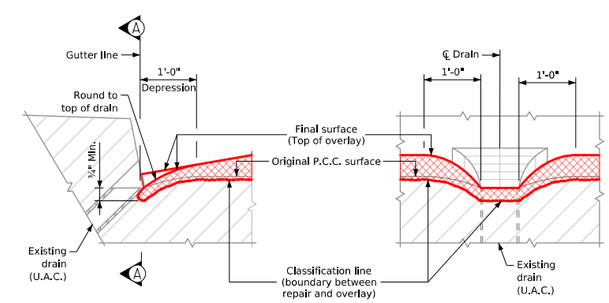
Overlay Deck Repair - Quantities



Section A-A

Deck Repair Detail at Drain

(Required at ?? Locations)



Section A-A

Deck Repair Detail at Drain

(Required at ?? Locations)

FILE NO.	ENGLISH	DESIGN TEAM	Overlay Deck Repair - Quantities	Standard Sheet 1038	COUNTY	PROJECT NUMBER	SHEET NUMBER

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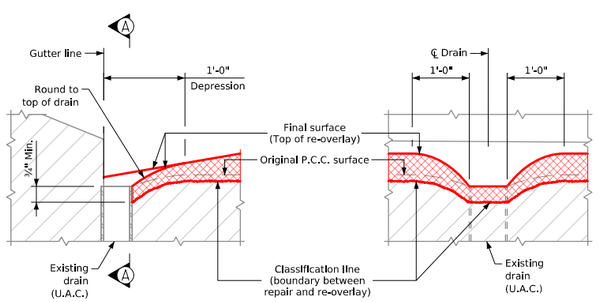
Revised 11-2015: Modified "Design History" Table to State "(Includes this Design)".
Revised 03-2017: Modified Construction: Standard Specifications Bridge Construction, Series to 2015, (Was 2012).
Revised 08-2026: This Sheet redrawn, updated all details.
RepairRetrofitBridges.dgn - 1038 - This Sheet Redrawn 09-08-1988. This Sheet Re-Issued 07-2023.

Overlay Deck Repair - Quantities Standard Sheet 1038

Control Point:

Note: Deck Repair Drawing Models are Referenced Outside of Border. Either Move in Place or Modify "Orientation" in Reference Dialog.

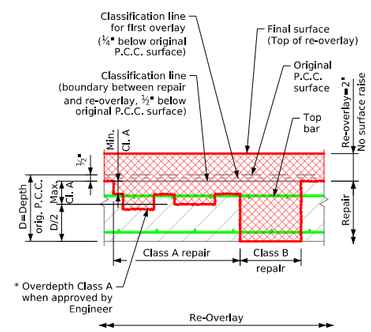


Section A-A

Deck Repair Detail at Drain

(Required at ?? Locations)

* Per IDOT Std. Spec. 2413.03.C.3.b, limited areas of Class A removal may exceed 50% of the floor thickness at the Engineer's direction. These limited areas of excess depth (overdepth) will be measured as Class A deck repair.



Repair and Re-Overlay Definition

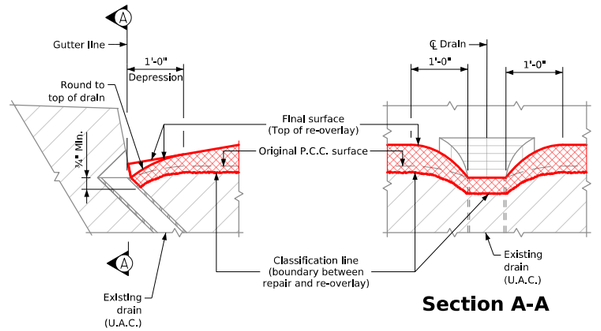
Location:
Maintenance No.

Note: Roadway quantites shown elsewhere in these plans.

Design History at this Site
(Includes this Design)

Des. No.	Type of Work
???	Original Design
???	???

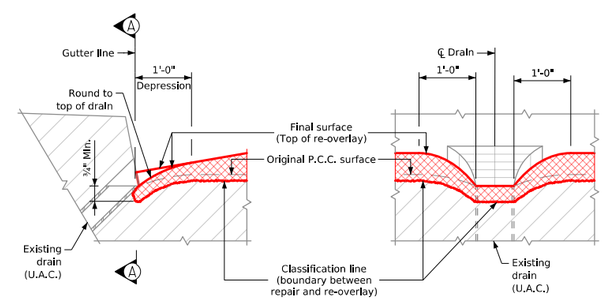
Re-Overlay Deck Repair - Quantities



Section A-A

Deck Repair Detail at Drain

(Required at ?? Locations)



Section A-A

Deck Repair Detail at Drain

(Required at ?? Locations)

Revised 11-2015: Modified "Design History" Table to State "(Includes this Design)".
Revised 03-2017: Modified Construction: Standard Specifications Bridge Construction, Series to 2015, (Was 2012).
Revised 08-2026: This Sheet Redrawn, updated all details.
RepairRetrofitBridges.dgn - 1038R - This Sheet Issued 10-2012. This Sheet Re-Issued 07-2023.

FILE NO.	ENGLISH	DESIGN TEAM	Re-Overlay Deck Repair - Quantities	Standard Sheet 1038R	COUNTY	PROJECT NUMBER	SHEET NUMBER

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Re-Overlay Deck Repair - Quantities Standard Sheet 1038R

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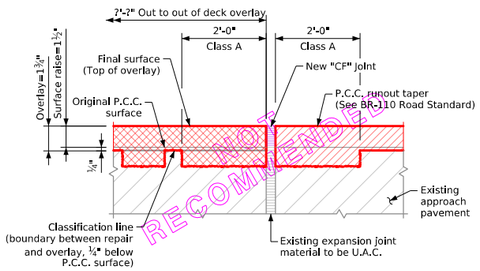
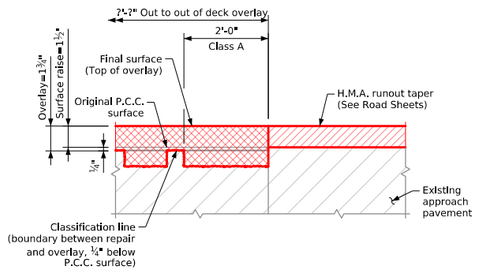


Part Longitudinal Section Along Roadway

? Abutment



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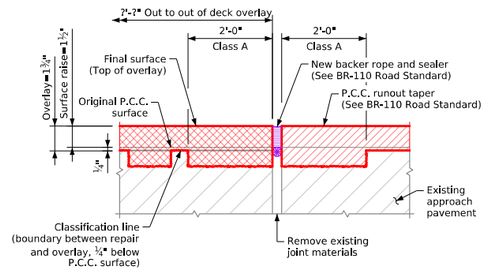

Part Longitudinal Section Along Roadway

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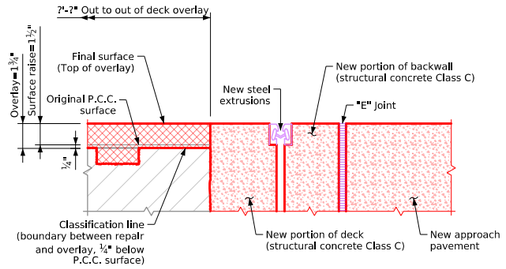

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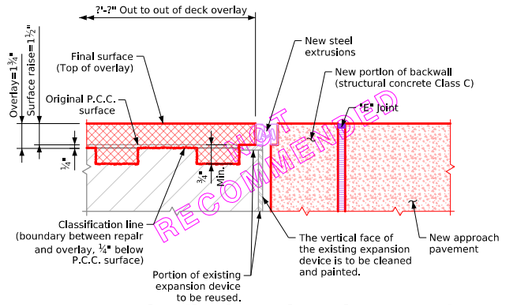

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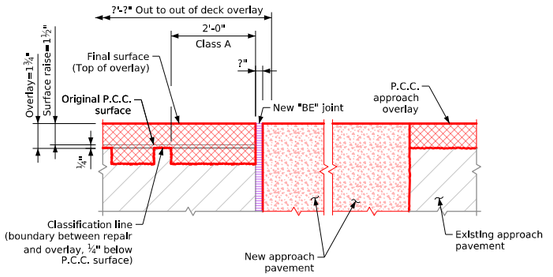

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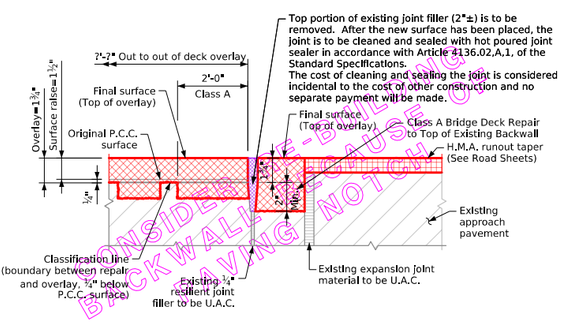

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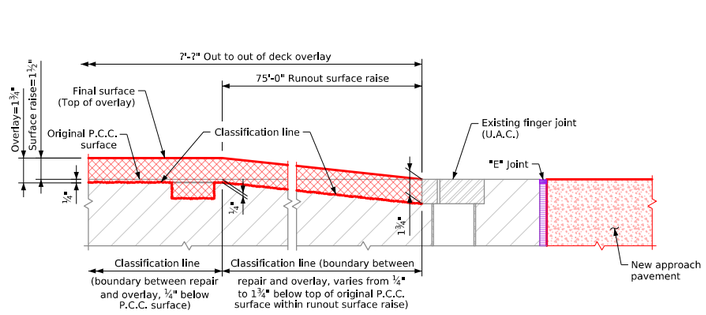

Part Longitudinal Section Along Roadway

? Abutment

Note: The 2'-0" Class A repair area shown at the joint at the end of the bridge deck shall be removed to a minimum depth 1" below the existing top mat of reinforcing. The existing bridge deck reinforcing bars shall be carefully exposed and incorporated into the new construction work. The 2'-0" Class A repair area shall be placed monolithically with overlay.

Note: The 2'-0" Class A repair area shown on the approach pavement at the joint shall be removed to a minimum depth 1" below the existing top mat of reinforcing. The existing approach pavement reinforcing bars shall be carefully exposed and incorporated into the new construction work. The 2'-0" Class A repair area shall be placed monolithically with the P.C.C. runout taper.

Overlay Deck Repair Details

Note to Designer: Include the 2'-0" Class A detail and note for the bridge deck on all overlay plan sets that have movable abutments.

Note to Designer: Include the 2'-0" Class A detail and note on all overlay plan sets that include P.C.C. runout taper on approach pavement.

FILE NO.	ENGLISH	DESIGN TEAM	Overlay Deck Repair Details	Standard Sheet 1040	COUNTY	PROJECT NUMBER	SHEET NUMBER	

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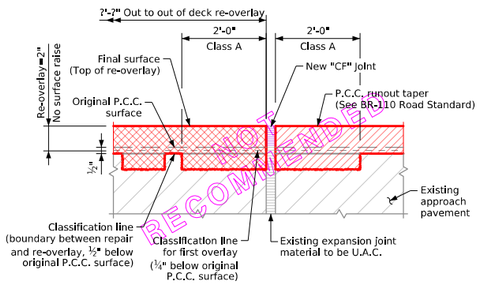
Revised 10-2012: Added 2'-0 Class A Repair At Joints Shown & Bordered Note. Added Repair Details From Volded 1041 Standard.
Revised 03-2017: Changed Reference To Road Standard BR-111. (Was RK-17). Changed Note Stating "Existing ¼" Resilient Joint Filler to be U.A.C." (Was Preformed Joint Filler).
Revised 09-2018: Changed sheet name to "Overlay Deck Repair Details" from "Overlay Deck Repair Details - 1040".
Revised 07-2023: This Sheet Reformatted 09-08-1988. This Sheet Re-Issued 07-2023.
RepairRetrofitBridges.dgn - 1040 - This Sheet Reformatted 09-08-1988. This Sheet Re-Issued 07-2023.

Overlay Deck Repair Details Standard Sheet 1040

Control Point:



Part Longitudinal Section Along Roadway

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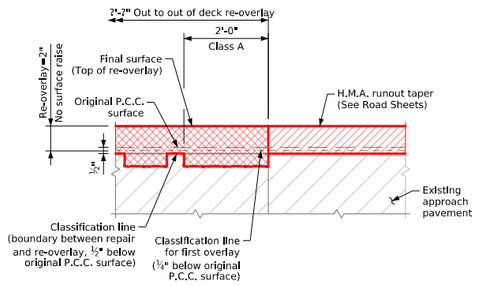

Part Longitudinal Section Along Roadway

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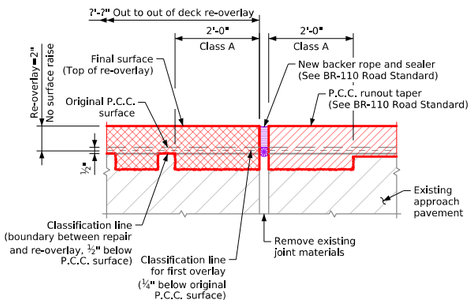

Part Longitudinal Section Along Roadway

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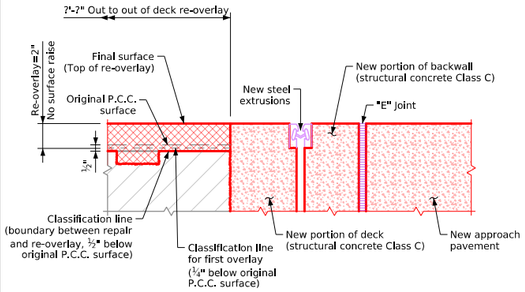

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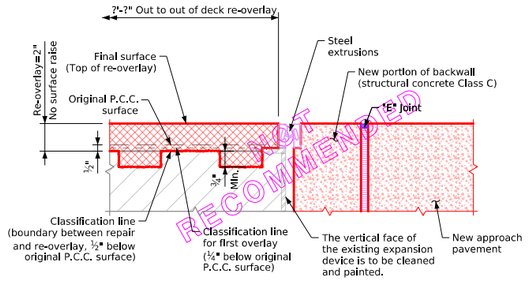

Part Longitudinal Section Along Roadway

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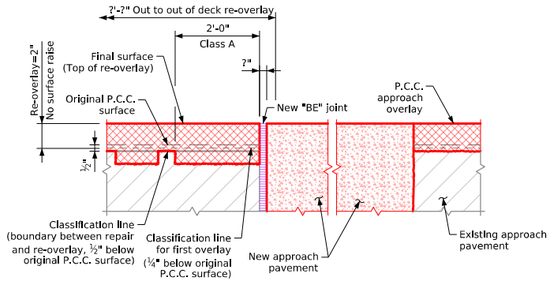

Part Longitudinal Section Along Roadway

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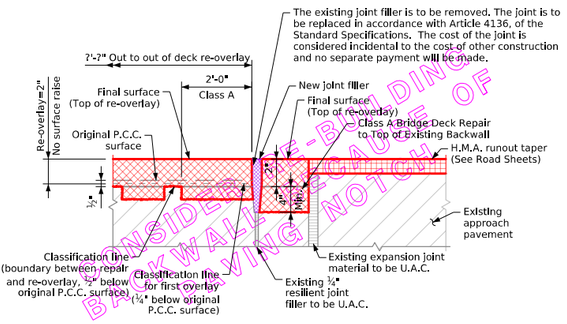

Part Longitudinal Section Along Roadway

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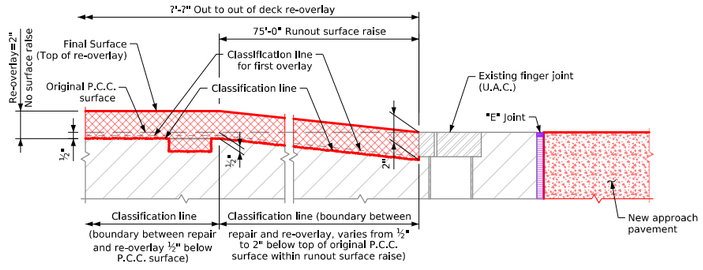

Part Longitudinal Section Along Roadway

? Abutment

Note: The 2'-0" Class A repair area shown at the joint at the end of the bridge deck shall be removed to a minimum depth 1" below the existing top mat of reinforcing. The existing bridge deck reinforcing bars shall be carefully exposed and incorporated into the new construction work. The 2'-0" Class A repair area shall be placed monolithically with re-overlay.

Note: The 2'-0" Class A repair area shown on the approach pavement at the joint shall be removed to a minimum depth 1" below the existing top mat of reinforcing. The existing approach pavement reinforcing bars shall be carefully exposed and incorporated into the new construction work. The 2'-0" Class A repair area shall be placed monolithically with the P.C.C. runout taper.

Re-Overlay Deck Repair Details

Note to Designer: Include the 2'-0" Class A detail and note for the bridge deck on all re-overlay plan sets that have movable abutments.

Note to Designer: Include the 2'-0" Class A detail and note on all re-overlay plan sets that include P.C.C. runout taper on approach pavement.

Revised 03-2017: Changed Reference to Road Standard BR-111. (Was RK-17). Changed Note Stating "Existing ¼" Resilient Joint Filler to be U.A.C." (Was Preformed Joint Filler).
Revised 07-2023: Changed Reference to Road Standard BR-110. (Was RK-16).
Revised 10-2023: Changed Reference to Road Sheets. (Was Bridge Sheets).
RepairRetrofitBridges.dgn • 1040R • This Sheet Issued 10-2012. This Sheet Re-Issued 07-2023.

FILE NO.	ENGLISH	DESIGN TEAM	Re-Overlay Deck Repair Details	Standard Sheet 1040R	COUNTY	PROJECT NUMBER	SHEET NUMBER	
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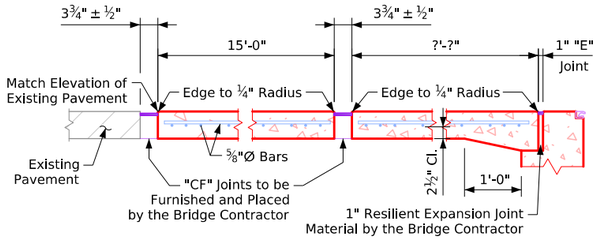
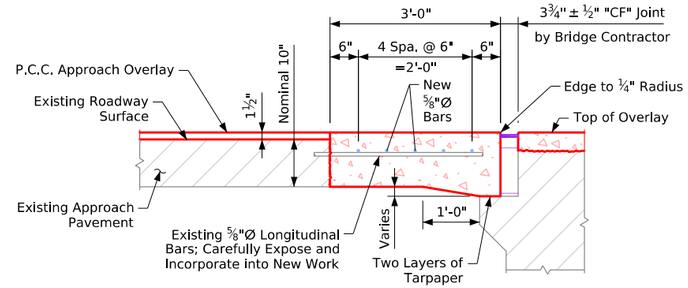
Re-Overlay Deck Repair Details Standard Sheet 1040R

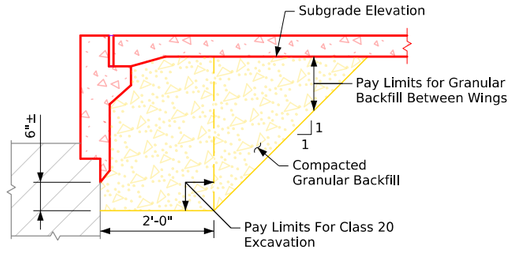


Part Longitudinal Section Thru Approach Pavement



Section B-B

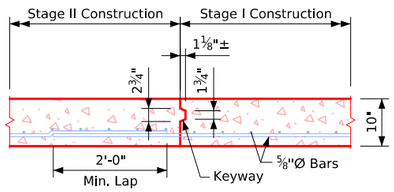
Note: Add Sections A-A and B-B as Needed.



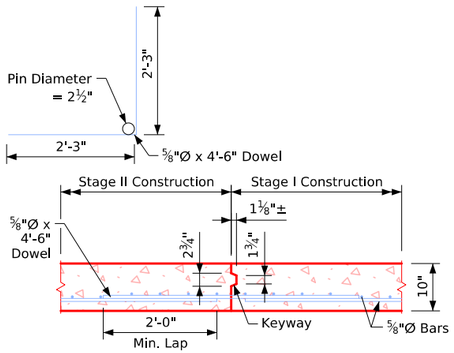
Granular Backfill Details

Approach Pavement Details

Required at ?



Section A-A



Section A-A

Approach Pavement Quantities

Location	Quantity
? Abutment - Stage I	?.?
? Abutment - Stage II	?.?
Total (Sq. Yd.)	?.?

Note: All approach pavement reinforcing is to be #5 bars.

Approach pavement reinforcing and joint material to be included in price bid for "Bridge Approach Section Reinforced as per Plan".

The "E" joints shall be sealed as directed by the Engineer. The sealer shall be as specified in the Standard Specifications.

The concrete used for the approach pavement shall be pavement mix and placed in accordance with the current specifications for concrete paving, including vibration.

See the following Iowa D.O.T. Road Standards for details of joint materials: ?

Deck Repair - Approach Pavement

Revised: Road Standard Designation Deleted from Notes. Arch. Tape No. 9 Dated 07-12-1989.
Revised 03-2017: Changed Note Stating "1" Resilient Expansion Joint Material by the Bridge Contractor" (Was Preformed Expansion Joint Filler).
RepairRetrofitBridges.dgn - 1042 - This Sheet Redrawn 09-08-1988. This Sheet Re-Issued 07-2023.

FILE NO.	ENGLISH	DESIGN TEAM	Deck Repair - Approach Pavement	Standard Sheet 1042	COUNTY	PROJECT NUMBER	SHEET NUMBER	

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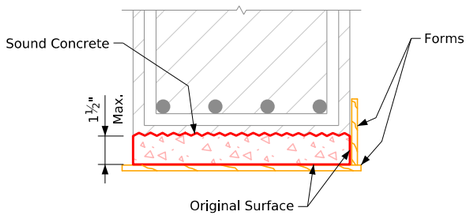
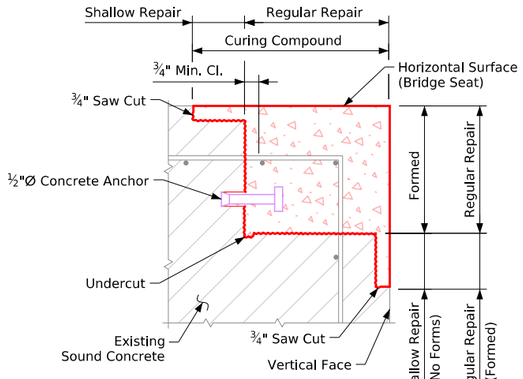
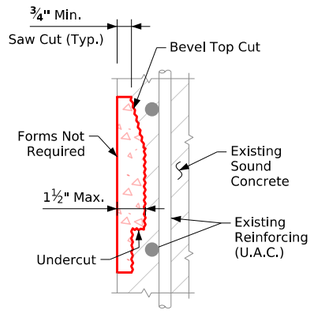


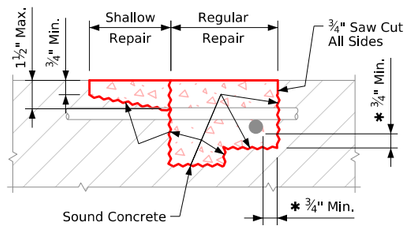
Shallow Repair Bottom Surface



Corner Repair

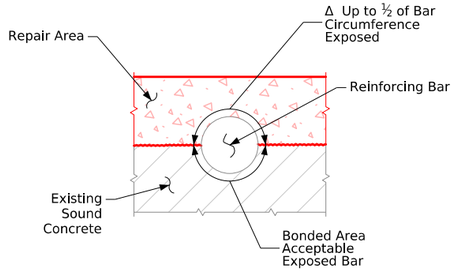


Shallow Repair Vertical Face

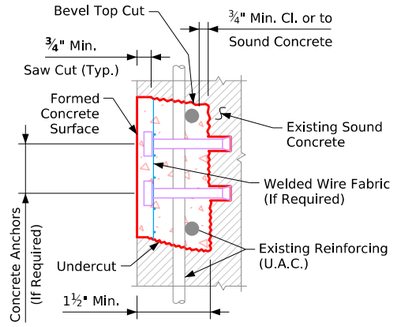


Repair Definition

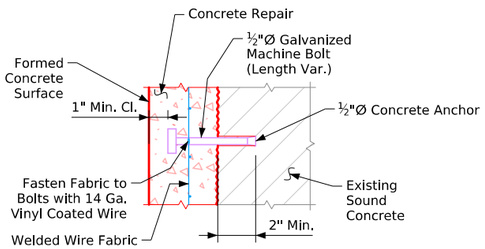
✱ Indicates Clearance for an Un-Bonded Rebar.



Δ If more than ½ of the rebar is exposed it shall be treated as an un-bonded rebar.

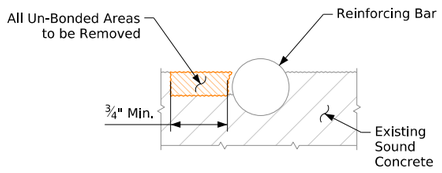


Regular Repair Vertical Face



Anchor Detail

For Spacing and Use of Concrete Anchors and WWF See the Repair Notes.



Concrete Removal Adjacent to Reinforcing

Repair Notes:

The spalled and hollow areas of this bridge as noted and shown in these plans shall be repaired as follows:

- All the costs of equipment and materials required to repair the spalled and hollow areas of this bridge shall be included in the price bid for "Concrete Repair".
- The price bid for "Concrete Repair" shall include the cost of all concrete anchors and welded wire fabric required by the plans.
- The Engineer shall determine and outline by visual and audible inspection the actual areas of the concrete repairs. The Contractor shall be paid for the actual amount of repairs made on a square foot basis based on the price bid per square foot.
- All existing reinforcing bars that are exposed by the concrete removal shall be cleaned and carefully incorporated into the new work, except badly deteriorated existing reinforcing which shall be replaced as directed by the Engineer.
- The concrete anchors required shall have a minimum pull out of 5,000 lbs based on 4,000 psi concrete. An anchor meeting the requirements of Iowa D.O.T. Materials I.M. 453.09 and the pull out load above is required. The anchors shall be galvanized and shall be installed according to recommendations of the Manufacturer. The cost of furnishing and installing the concrete anchors shall be included in the price bid for "Concrete Repair".
- The welded wire fabric shall be ASTM A185 and galvanized as per ASTM A-641. The WWF wires shall be spaced 3x3 or 4x4 and the wires shall have a nominal area of 0.014 to 0.029 square inch inclusive, example "WWF 3x3 - W1.4xW2.9".

Where reinforcement has been exposed and clearance around the periphery of the existing bar is provided, no supplemental reinforcing is required, except where existing reinforcement density and pattern are such that individual open spaces between bars are of 1.5 square feet or larger. For this condition ½"∅ concrete anchors and welded wire fabric shall be installed at the rate of one concrete anchor with WWF per each 1.5 square feet of area within each open space.

Repairing the structural concrete shall be in accordance with Section 2426 of the Standard Specifications.

Concrete Placement Quantities

Mark	Type	Units	Quantity
①	Shallow Repair	Sq. Ft.	?
②	Regular Repair	Sq. Ft.	?
		Total (Sq. Ft.)	?

Estimated Concrete Repair Quantities

Description	Units	Amount
Concrete Repair	Sq. Ft.	?

Concrete Repairs

Revised 10-2014; Deleted All References to Grout, Section 2426 Covers this Requirement and Doesn't Need to be Stated on the Plans.
RepairRetrofitBridges.dgn - 1045 - This Sheet Redrawn 09-27-1990. This Sheet Re-Issued 07-2023.

FILE NO.	ENGLISH	DESIGN TEAM	Concrete Repairs	Standard Sheet 1045	COUNTY	PROJECT NUMBER	SHEET NUMBER	

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Control Point:

Beam End Repair Notes:

It is estimated that ????? beam end(s) will be repaired. The final quantity and limits of beam end areas shall be determined by the Engineer.

The Contractor shall notify the Engineer when concrete removals are complete by each location to allow inspection by the Engineer prior to placement of concrete or repair mortar.

The Contractor shall report tendon or reinforcing bar section loss, exposed during removal work, to the Engineer prior to performing any repair work. The Engineer shall be given adequate time (7 days max.) to determine whether beam reinforcing is required. The Contractor shall incorporate this time into the construction schedule with work in other areas of the project in order to not delay the project.

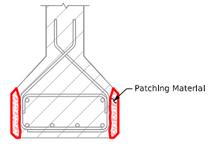
Removal tools shall be limited to 15 lb chipping hammers and to hand tools without power.

The Contractor shall perform the concrete repair work in accordance with the following procedures and/or as directed by the Engineer:

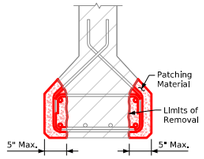
1. Initiate removal of unsound concrete with ½" saw cuts at perimeter. Do not cross cut at corners. Stop saw cuts short of corners and remove concrete by hand. Adjust depth of saw cut as required to prevent cutting of existing reinforcing steel or strands. Extreme care shall be exercised during concrete removal so that exposed strands and reinforcing bars are not damaged. Any damage done to the strands or bars by the Contractor shall be repaired by the Contractor at no additional cost to the State.
2. Remove deteriorated areas to sound concrete and chip square. Boundaries to be square with no feathered edges. Sandblast concrete surfaces in the repair area and the exposed steel to bare metal. Remove all dust and debris resulting from chipping and blasting by using clean compressed air.
3. If concrete removal results in more than half the diameter of any reinforcing bar or prestressing strand being exposed, then removal shall continue to a minimum of ¾" behind the first interior strand. If removals could exceed the 5" maximum horizontal depth, contact the Engineer prior to removal.
4. Report to the Engineer, prior to repair, section loss of tendons or reinforcing steel exposed during removals.
5. Apply two coats of protective coating/bonding agent (products are listed in the table on this sheet) to exposed prestressing strands and reinforcing bars according to manufacturer's recommendations.
6. Apply patching material. Type of material and application of material depends upon the extent of concrete removal and the two types of repair are to be as follows:
   A. Shallow repair: Shallow repair areas are those where concrete removal did not result in reinforcing bars or prestressing strands being exposed for more than half their diameters. Patching material shall be as listed in the table on this sheet. Patching materials contain corrosion inhibitors. Apply patching material to match original beam surface. Patch need not be formed. Follow manufacturer's instructions and recommendations for mixing, placing and curing.
   B. Regular repair: Regular repair areas are those where concrete removal extended behind the reinforcing bars and/or prestressing strands. These areas are to be placed using forms to match the original beam surface. Patching material shall be one of the grouts as listed in the table on this sheet. Patching materials contain corrosion inhibitors. Follow manufacturer's instructions and recommendations for mixing, placing and curing. Forms are to remain in place for seven days.
7. Sandblast 6'-0" of the ends of the repaired beams as shown on this sheet. The sandblasting shall be a light blast just enough to expose the fine aggregates. Do not sandblast patching material. All costs associated with sandblasting are to be included in the price bid for "Repair Beam Ends".
8. Apply concrete sealer to sandblasted portions of beams ends. Do not seal patching material.

All costs include equipment and materials required to repair deteriorated beam ends as detailed in these plans. These details shall be included in the price bid for "Repair Beam Ends". The Engineer will count each end of each beam properly repaired, and the Contractor will be paid the contract unit price per each repair.

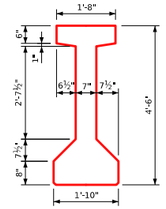
Provide Beam Sections for Your Structure as Needed.



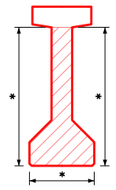
Shallow Repair Areas



Regular Repair Areas



Beam Section

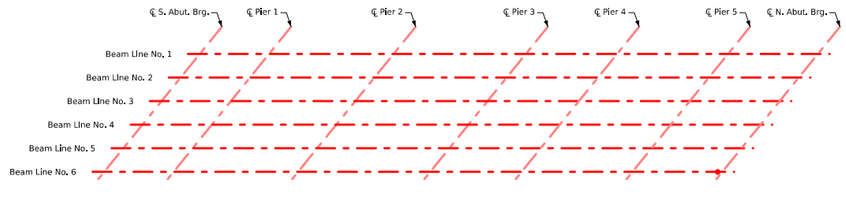


Limits of Sandblasting

Note: The repair areas shown are schematic only. The actual area to be repaired will be determined by the Engineer. For location of beam ends to be repaired see beam layout below.

* Sandblast the surfaces of the bottom flange and web within the limits shown to 6 feet of the beam ends.

Provide Situation Plan for Your Structure as Needed.



● - Regular Beam End Repair Locations

$ - Shallow Beam End Repair Locations

Beam Layout

Provide Product and Manufacturer as Needed.

Table of Manufacturers

Manufacturer	Bonding Agent	Shallow Repair	Regular Repair
BASF	Mastermaco P 124	Masteremaco N 350 CI	Masteremaco S 477CI
Euclid	Duralprep A.C.	Verticoat Supreme	Eucorepair
Sika	Sika Armatec 110 Epocem	Sikatop 123 Plus	Sikatop 111 Plus

Beam End Repair Details & Notes

FILE NO.	ENGLISH	DESIGN TEAM	Concrete Beam Repair Details	Standard Sheet 1055	COUNTY	PROJECT NUMBER	SHEET NUMBER
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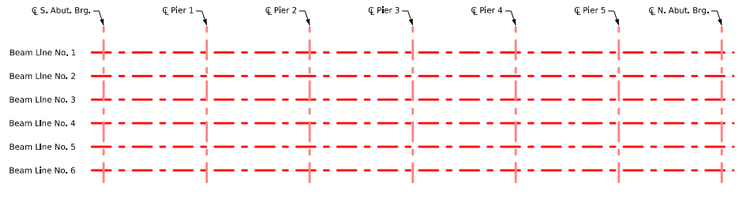
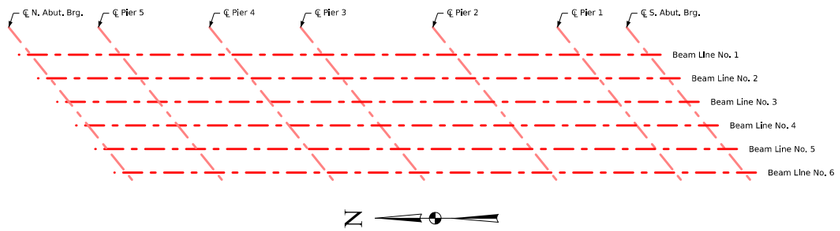
RepairRetrofitBridges.dgn - 1055 - This Sheet Reused 03-01-2017. This Sheet Re-Reused 07-2023.

Provide Situation Plan for Your Structure as Needed.



Provide Situation Plan for Your Structure as Needed.



Concrete Beam Repair Details Standard Sheet 1055

Beam Repair Notes:

Refer to Article 2426 of the Standard Specifications for materials and construction methods that are adequate for structural concrete repair of the damaged beams. Bonding grout will not be required.

Refer to Article 2426.03, B of the Standard Specifications for surface preparation requirements when the reinforcing steel has been exposed as a result of concrete spalling or removal of loose and unsound concrete.

Prepare the surface of the old concrete by removing all loose, disintegrated or unsound concrete from the beam as shown on these plans and as designated by the Engineer. All concrete removals shall be complete before commencing placement of new concrete. Edge of repair area shall be sawcut ¾" deep.

When surface preparation and cleaning is complete the necessary forms are to be installed. Forms shall be positively held in the proper position to restore beam to original dimensions.

Prior to concrete placement, traffic on ???? shall be shifted to one lane away from the beam(s) under repair. Traffic shall be maintained in one lane for a 24 hour concrete curing period. Restoration of the beam cross-section shall be done in two stages on the ?? bound ???? bridge to shift live load away from the beam(s) under repair for the 24 hours of concrete curing.

All concrete shall be Class "O" Structural Concrete.

The coarse aggregate shall be as described in Article 4115.05 of the Standard Specifications (½" maximum size).

The repaired surfaces shall be cured by leaving the forms in place and any exposed concrete covered with wet burlap for at least 7 days.

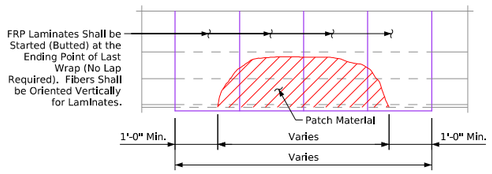
Specifications for fiber reinforced polymer (FRP) repair of beams are included in the Developmental Specifications for "Fiber Reinforced Polymer Repair for Concrete Containment of Collision Damaged Pretensioned Prestressed Concrete Beams". The manufacturer of FRP laminates should be present to advise the Bridge Contractor on application and placement of FRP laminates.

All costs associated with the following shall be included in the price bid for "Beam Repair, As Per Plan":

- Removal of unsound or loose concrete, preparing, and cleaning repair areas.
- Removal of existing damaged FRP laminates.
- Restoring beam to its original cross sectional dimensions with concrete as noted and shown in the plans.
- Application of fiber reinforced polymer laminates to the beam as shown in the plans and Developmental Specifications for "Fiber Reinforced Polymer Repair for Concrete Containment of Collision Damaged Pretensioned Prestressed Concrete Beams."

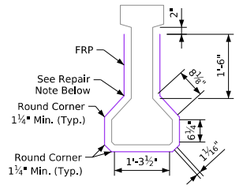
Epoxy injection of cracks due to beam collision damage will be done by Iowa D.O.T. personnel. Coordination will be required with Iowa D.O.T. personnel to allow for the epoxy injection of cracks after the concrete patch has cured and before application of FRP laminates.

The cure time for the repairs shall follow what is recommended by the FRP Manufacturer.



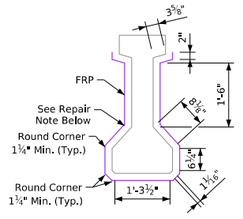
Impact Area Repair Detail
(Typical)

Note: See Additional Detail Outside of Border. Either Move in Place or Modify "orientation" in Reference Dialog.



Typical Section Thru Wrapped Beam

Repair Note: All interior corners shall be ground smooth to ensure proper adhesion between the FRP laminate and concrete surface.



Typical Section Thru Wrapped Beam

Repair Note: All interior corners shall be ground smooth to ensure proper adhesion between the FRP laminate and concrete surface.

Repair Details for Beam No. ??, ??, ?? and ?? on ?? Bound ???? and No. ?? on ?? Bound ????

FRP Laminate Replacement

The portions of damaged FRP laminate on beam #?? ?? bound ???? shall be removed by grinding. Care shall be taken during grinding so concrete surface of beams is not damaged. Removal shall be to straight lines parallel to the longitudinal or transverse axis of the beam. Limits of removal shall be a minimum of 6" beyond where damage is detected. Where overlap of the FRP laminates are necessary, the existing FRP laminate to receive the lap shall have all paint removed and FRP laminate roughened within the limits of the lap. The surface preparation and FRP laminate application shall conform to the requirements of the Developmental Specifications for "Fiber Reinforced Polymer Repair for Concrete Containment of Collision Damaged Pretensioned Prestressed Concrete Beams". All costs associated with the FRP laminate replacement shall be included in the lump sum price for "Beam Repair, As Per Plan".

FRP = Fiber Reinforced Polymer

Beam FRP Repair Details & Notes

FILE NO.	ENGLISH	DESIGN TEAM	Concrete Beam Fiber Reinforced Polymer (FRP) Repair Details	Standard Sheet 1057s1	COUNTY	PROJECT NUMBER	SHEET NUMBER	

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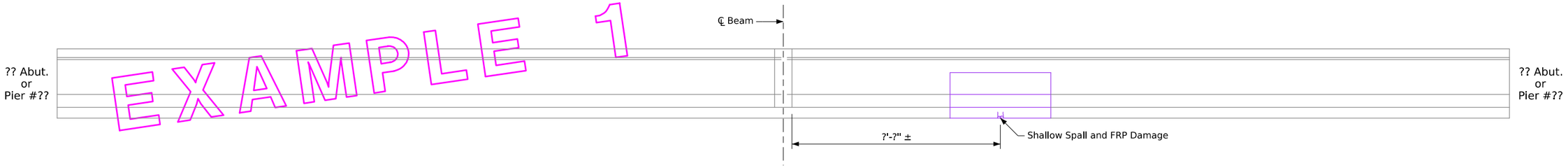
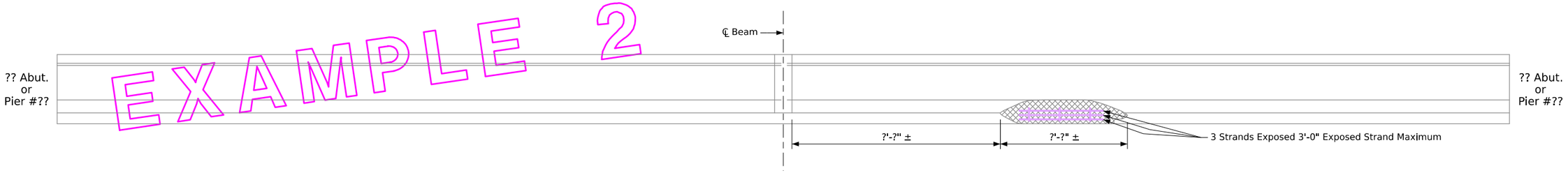
Concrete Beam Fiber Reinforced Polymer (FRP) Repair Details Standard Sheet 1057s1

EXAMPLE 1



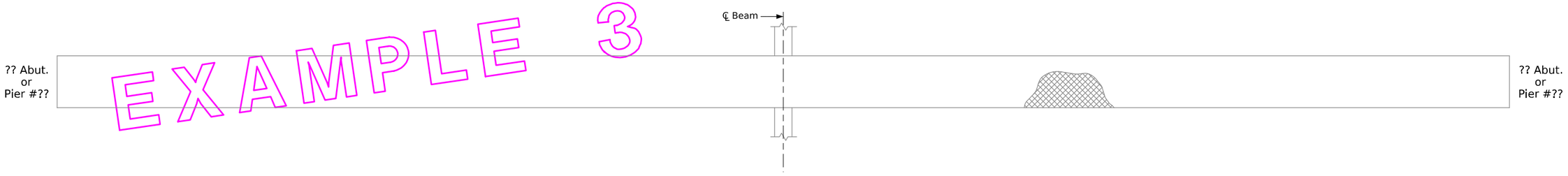
?? Bound ???? Beam #?? Looking North

EXAMPLE 2



?? Bound ???? Beam #?? Looking North

EXAMPLE 3



?? Bound ???? Beam #?? Bottom View

Hollow Concrete
Spalled Concrete

FRP = Fiber Reinforced Polymer

Beam FRP Repair Details

RepairRetrofitBridges.dgn - 1057s2 - This Sheet Issued 03-01-2017. This Sheet Re-Issued 07-2023.

FILE NO.	ENGLISH	DESIGN TEAM	Concrete Beam Fiber Reinforced Polymer (FRP) Repair Details	Standard Sheet 1057s2	COUNTY	PROJECT NUMBER	SHEET NUMBER	

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